

AMENDMENTS TO THE SPECIFICATION:

Please amend the paragraph on page 1, lines 10 through 18 as follows:

~~Nowadays~~ Nowadays, liquid crystal display devices are in widespread use in various monitors for personal computers or the like, display devices for cellular phones, and so forth, and are expected to increasingly spread hereafter, and in fact, it is being planned to develop their use in large-screen television sets. In such liquid crystal display devices, what is called a micro color filter system is widely used as a color display system.

Please amend the paragraph on page 2, line 24 through page 3, line 7 as follows:

This ECB type liquid crystal display device includes a transmission type in which a liquid crystal cell holding a liquid crystal is interposed between a pair of substrates and a polarizing plate is disposed on each of its front side and back side ~~each~~, and a reflection type including a single polarizing plate type in which the polarizing plate is disposed only on one substrate, and a double polarizing plate type in which the polarizing plate is disposed on both the substrates and a reflecting plate is provided on the outside of one polarizing plate.

Please amend the paragraph on page 3, lines 8 through 20 as follows:

Here, in the case of, e.g., the transmission type ECB type liquid crystal display device, the linear polarization transmitted through one polarizing plate to have entered becomes light,

each wavelength light of which has turned to elliptical polarization in a different polarization state by the birefringent action of a liquid crystal layer while being transmitted through the liquid crystal cell. This light enters the other polarizing plate, and the light transmitted through the other polarizing plate becomes colored light in a color corresponding to the ratio of light intensity of each wavelength light which constitutes that light.

Please amend the paragraph on page 4, lines 14 through 25 as follows:

Fig. 10 is a view showing retardation levels and colors corresponding thereto where the ECB type liquid crystal display device is driven under crossed Nicol (cross polarization). As shown in Fig. 10, colors change in accordance with birefringence levels. Here, when using as a liquid crystal mode, e.g., a material having negative $\Delta\epsilon$ which stands perpendicularly aligned when no voltage is applied, black is displayed when no voltage is applied, and colors are so change changed as to be black \rightarrow gray \rightarrow white \rightarrow yellow \rightarrow red \rightarrow purple \rightarrow blue \rightarrow yellow \rightarrow purple \rightarrow light blue \rightarrow green with an increase in voltage.

Please amend the paragraph on page 6, lines 18 through 20 as follows:

The present invention is still further characterized in that the display is a black display when no voltage is applied.

Please amend the paragraph on page 9, lines 1 through 4 as follows:

Here, these substrates 81a and 81b are provided with electrodes 82a and 82b formed of a material such as ITO (indium-tin oxide) which are each to apply for applying a voltage to liquid crystals (layer) 85.

Please amend the paragraph on page 11, lines 8 through 16 as follows:

First, the temperature dependence of the contrast ratio is primarily governed by temperature dependence of black luminance. This black luminance can be made free of temperature dependence by providing a perpendicular alignment and normally black constitution, i.e., by making a black display when no voltage is applied. More specifically, in the state that liquid crystal molecules are upright when no voltage is applied, no birefringence occurs.

Please amend the paragraph on page 11, lines 17 through 24 as follows:

That is, although the Δn , a physical-property value of the liquid crystals, has the temperature dependence, the liquid crystals are in the state of perpendicular alignment, and hence its birefringence level is always zero even when the temperature is changed. By setting this state to be the black state, it is possible to provide the constitution that the black luminance is not change changed due to temperature.

Please amend the paragraph on page 12, line 26 through page 13, line 9 as follows:

As is well known, this transformation is determined by the voltage, and does not depend on the cell thickness. The angle of inclination θ_m of liquid crystal molecules at the cell middle portion (bulk) may be found by calculation according to the elastic continuum theory. In the calculation made here, it is necessary to know values of physical properties such as the elasticity constant. From the values of alignment state and refractive-index anisotropy thus found, the birefringence level brought about when voltage is applied is found by calculation.

Please amend the paragraph on page 13, lines 10 through 16 as follows:

The present inventor has measured the temperature dependence of retardation values of the Nn-type liquid crystal. As a result, they have the present inventor has discovered that there are materials on which the temperature dependence of retardation values is little seen at a voltage value between the threshold value of the Freedericksz transition and the saturated voltage.

Please amend the paragraph on page 13, line 23 through page 14, line 3 as follows:

The retardation values little change change little in the temperature range of from 0°C to 60°C where the voltage is in the range of from 2.9 V to about 3.2 V. When viewed in the range of from 0°C to about 35°C, which is an actual-service temperature range, the voltage range in which the retardation can be deemed to be free of the temperature dependence can be said to be from 0 V to about 4 V.

Please amend the paragraph on page 14, lines 13 through 24 as follows:

On the other hand, with regard to the above materials as well, it can be seen also from Fig. 11 that the retardation value in the voltage range close to the value of saturated voltage shows a very large temperature dependence. This is considered as follows: Upon upon application of sufficiently high voltage, almost all the liquid crystal layer extending from the bulk to the interfaces has been aligned in the direction parallel to the substrates, so that it is directly influenced by the temperature dependence of the Δn , and the temperature dependence of the retardation level as a consequence become become becomes very large.

Please amend the paragraph on page 15, lines 6 through 12 as follows:

In practice, however, the condition that the retardation little changes changes little due to temperature is often limited to a narrow voltage range. In such a case, a voltage must be applied which can make the temperature dependence small only in specific colors and is compatible with temperatures at the time of displaying other colors.

Please amend the paragraph on page 16, lines 7 through 15 as follows:

Fig. 2 presents a color difference threshold Wright and Pitt have found (Noboru Ohta, "Shikisai Kogaku (Color Optics)", p.116 p. 116). According to this article, colors of from green to red are perceivable even when the wavelength deviates by 2 nm or less, whereas blue is not perceivable until the wavelength deviates by 4 nm or more. This is considered due to the fact that a human's visual sensitivity (luminosity factor) to blue is not good.

Please amend the paragraph on page 16, lines 16 through 21 as follows:

That is, even when the color tone has no temperature dependence in respect of red or purple and has temperature dependence in respect of blue as in the liquid crystal display device of the present invention, the temperature dependence of the blue ~~can not~~ cannot easily be sensed for the above reason.

Please amend the paragraph on page 18, lines 14 through 24 as follows:

Here, as to the single-bit test cell, two sheets of substrates on which a pattern, comprised of squares of ITO wherein each side is 1 cm, was formed were superposed one on another to form a test cell. As for the AM cell, an active-matrix substrate on which TFTs were disposed was used as one substrate, and a substrate on which color filters were disposed in accordance with the Examples was used as the other substrate. In this case, the shape of pixels and the constitution of color filters were changed in accordance with the Examples.

Please amend the paragraph on page 19, lines 18 through 22 as follows:

To sum up the constitution used commonly, the basic constitution was the same constitution as that shown in Fig. 1, and the cell thickness and the color filter constitution were changed in accordance with the Examples.

Please amend the paragraph on page 22, lines 5 through 12 as follows:

Thus, inasmuch as the display color is present in the red or purple region when voltage is applied at the maximum voltage value, and where the cell thickness is set to 5.8 microns, it is possible to provide (a) a liquid crystal element in which the temperature dependence of color tones is not visible, and (b) a liquid crystal display device having such an element.

Please amend the paragraph on page 23, line 27 through page 24, line 8 as follows:

In the foregoing explanation, the reflection type liquid crystal element has been described. However, the present ~~invention~~ invention is not limited thereto, and as a matter of course, the present invention is also applicable also to the transparent type liquid crystal element and the semitransparent type liquid crystal element. Also, in place of the TFTs used as the driving means, MIM elements may be used or a simple matrix structure may be employed. Such a driving method may be used.